Name: Answer Key TP: ____

CW#38H: Two Column Proofs
Honors Geometry

CRS	Geometry Content
Objective	5.9 Write a two column proof

Think of writing a proof like solving a crime. You survey the crime scene, gather the facts, and write them down in your memo pad. To solve the crime, you take the known facts and, step by step, show who committed the crime. You conscientiously provide supporting evidence for each statement you make. We are not trying to "find an answer", but rather a process for which allows us to prove that something is in fact, true.

First, the blank structure of a proof should look like this:

Given: Known Information
Prove: Something something

Statement	**Reason**
Known Information	Given
------------------------	------------------------
(fact #1)	(why the fact #1 is true)
(fact #2)	(why the fact #2 is true)
(fact #...)	(why the fact #... is true)
Something something	

QED or □

The proof should *end* with what you are trying to prove

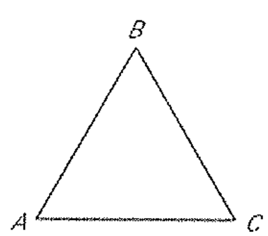
You can end your proof with QED, latin for *"Quod erat demonstrandum"* which means *"Which was needing to be proved"* It lets the reader know that something has been definitively proven. You can also draw a box: |

Postulate: statements that are assumed to be true w/out proof (a line contains two points)

Theorem: can be proved from definitions, postulates or previously proved theorems (ex- Pythagorean theorem)

*Record all postulate and theorems on yellow handout!

Example 1:
GIVEN: $m\angle A = m\angle B$, $m\angle B = m\angle C$
PROVE: $\angle A \cong \angle C$



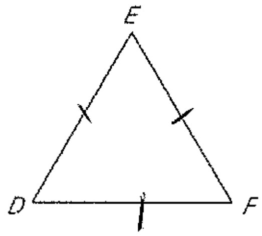
Statements	**Reasons**
1. $m\angle A = m\angle B$	1. given
2. $m\angle B = m\angle C$	2. given
3. $m\angle A = m\angle C$	3. transitive property
4. $\angle A \cong \angle C$	4. def'n of congruent angles

QED

PUSH IT TO THE LIMIT.

Example 2:
GIVEN: $DE = EF$, $EF = DF$

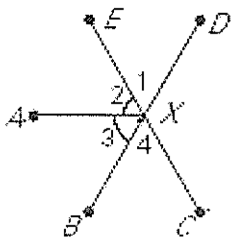
PROVE: $\overline{DF} \cong \overline{DE}$



Statements	Reasons
1. $DE = EF$	1. Given
2. $EF = DF$	2. Given
3. $DE = DF$	3. Transitive
4. $DF = DE$	4. symmetric
5. $\overline{DF} \cong \overline{DE}$	5. def'n ≅ segments

QED

Example 3:
Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$
Prove $m\angle 1 = m\angle 4$



Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. given
2. $m\angle AXD = m\angle$ _1_ $+ m\angle$ _2_	2. angle addition postulate
3. $m\angle AXC = m\angle$ _3_ $+ m\angle$ _4_	3. angle addition postulate
4. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	4. substitution
5. $m\angle 2 = m\angle 3$	5. given
6. $m\angle 1 + m\angle$ _3_ $= m\angle 3 + m\angle 4$	6. substitution
7. $m\angle 1 = m\angle 4$	7. subtraction prop of =

*write on yellow list

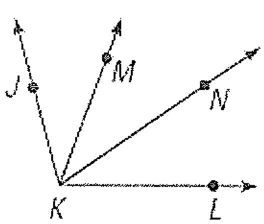
QED

1.
Given $BC = AB$
Prove $AC = AB + AB$

Statements	Reasons
1. $BC = AB$	1. Given
2. $AC = AB + BC$	2. segment addition post.
3. $AC = AB + AB$	3. substitution

QED

2.
Given: $\overrightarrow{KM}$ bisects $\angle JKN$, $\overrightarrow{KN}$ bisects $\angle MKL$
Prove: $m\angle JKM = m\angle NKL$



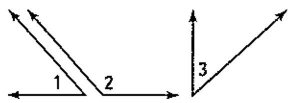
Statements	Reasons
1. $\overrightarrow{KM}$ bisects $\angle JKN$, $\overrightarrow{KN}$ bisects $\angle MKL$	1. Given
2. $\angle JKM \cong \angle MKN$	2. def'n of angle bisector
3. $\angle MKN \cong \angle NKL$	3. def'n of angle bisector
4. $\angle JKM \cong \angle NKL$	4. transitive prop

PUSH IT TO THE LIMIT.

3.

GIVEN ▶ ∠1 and ∠2 are supplements.
∠3 and ∠2 are supplements.

PROVE ▶ ∠1 ≅ ∠3

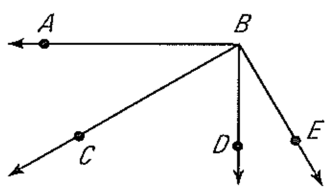


Statements	Reasons
1. ∠1 and ∠2 are supplements. ∠3 and ∠2 are supplements.	1. given
2. $m\angle 1 + m\angle 2 = 180°$ $m\angle 3 + m\angle 2 = 180°$	2. def'n of supp angles
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	3. substitution
4. $m\angle 1 = m\angle 3$	4. subtraction
5. $\angle 1 \cong \angle 3$	5. def'n of congruent segments

4.

GIVEN ▶ ∠*ABD* is a right angle.
∠*CBE* is a right angle.

PROVE ▶ ∠*ABC* ≅ ∠*DBE*

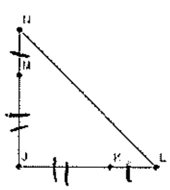


Statements	Reasons
1. ∠ABD is right ∠	1. Given
2. ∠CBE is right ∠	2. Given
3. ∠ABC + ∠CBD = ∠ABD	3. angle addition postulate
4. ∠CBD + ∠DBE = ∠CBE	4. angle addition postulate
5. ∠ABD ≅ ∠CBE	5. def'n congruent angles
6. ∠ABC + ∠CBD = ∠CBD + ∠DBE	6. substitution
7. ∠ABC = ∠DBE	7. subtraction

5)

Given: $\overline{LK} \cong \overline{NM}, \overline{KJ} \cong \overline{MJ}$

Prove: $\overline{LJ} \cong \overline{NJ}$



Statements	Reasons
1. $\overline{LK} \cong \overline{NM}, \overline{KJ} \cong \overline{MJ}$	1. given
2. LK = NM KJ = MJ	2. **Def. of congruent segments**
3. $LK + KJ = NM + MJ$	3. addition prop
4. LK + ~~MJ~~ KJ = LJ NM + MJ = NJ	4. **Segment Addition Postulate**
5. $LJ = NJ$	5. substitution
6. $\overline{LJ} \cong \overline{NJ}$	6. def'n congruent segments

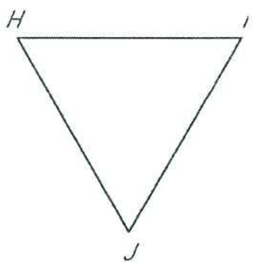
PUSH IT TO THE LIMIT.

HW#38H: Two Column Proofs
Honors Geometry
Due Date: Tuesday, Nov.13th, 2012

Name: ______________________________ TP: _____

Failure to show work on all problems or use complete sentences will result in a LaSalle.

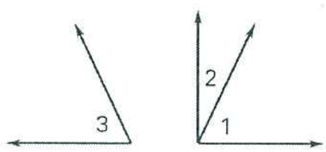
1. GIVEN: $HI = 9$, $IJ = 9$, $\overline{IJ} \cong \overline{JH}$
PROVE: $\overline{HI} \cong \overline{JH}$



Statements	**Reasons**
1. $HI = 9$	1. given
2. $IJ = 9$	2. given
3. $HI = IJ$	3. substitution
4. $\overline{HI} \cong \overline{IJ}$	4. def'n ≅ seg
5. $\overline{IJ} \cong \overline{JH}$	5. given
6. $\overline{HI} \cong \overline{JH}$	6. transitive

2. GIVEN: $\angle 3$ and $\angle 2$ are complementary.
$m\angle 1 + m\angle 2 = 90°$

PROVE: $\angle 3 \cong \angle 1$



Statements	**Reasons**
1. $\angle 3$ and $\angle 2$ are complementary	1. given
2. $m\angle 1 + m\angle 2 = 90°$	2. given
3. $m\angle 3 + m\angle 2 = 90°$	3. def'n comp ∠'s
4. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 2$	4. substitution
5. $m\angle 1 = m\angle 3$	5. subtraction
6. $\angle 1 \cong \angle 3$	6. def'n cong. angles

3. GIVEN: $AL = SK$
PROVE: $AS = LK$

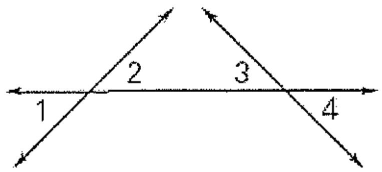
Statements	**Reasons**
1. $AL = SK$	1. given
2. $LS = LS$	2. reflexive
3. $AL + LS = SK + LS$	3. add prop of =
4. $AL + LS = AS$	4. seg + post
5. $SK + LS = LK$	5. seg + post
6. $AS = LK$	6. substitution

PUSH IT TO THE LIMIT.

4.

GIVEN: $\angle 2 \cong \angle 3$

PROVE: $\angle 1 \cong \angle 4$



Statements	Reasons
1. $\angle 2 \cong \angle 3$	1. given
2. $\angle 3 \cong \angle 4$	2. vertical angles
3. $\angle 2 \cong \angle 4$	3. transitive
4. $\angle 1 \cong \angle 2$	4. vertical
5. $\angle 1 \cong \angle 4$	5. transitive

5. At what point does the line y = -2x + 2 cross the x-axis? $y=0$

$\boxed{(1,0)}$

$0 = -2x+2$

$-2 = -2x$

$\boxed{x=1}$

6. Solve for x in the following equation:

$y = x^2 + 3w$

$\sqrt{y-3w} = x$

7. What are the roots of the equation $x^2 - 3x = 18$?

$x^2 - 3x - 18$

$(x+3)(x-6)$

$\boxed{x = -3, 6}$

8. x = {-2. 4} is a solution set for what quadratic equation?

$(x+2)(x-4)$

$\boxed{x^2 - 2x - 8}$

9. A circle has a circumference of 10π centimeters. What is the area of that circle, in terms of π?

$C = 10\pi$

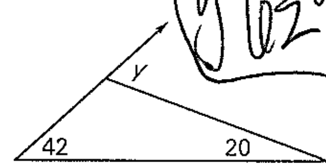
$d = 10$

$r = 5$

$\boxed{A = 25\pi \text{ cm}^2}$

10. Find the value of y in the figure below:

$\boxed{y = 62^\circ}$



PUSH IT TO THE LIMIT.

CW #39H

~~Classwork 47~~
Two-column proofs

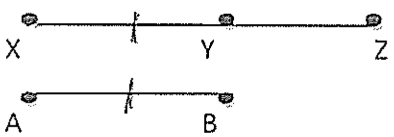
Name: answer key
Period:____ Date:________

CRS	Geometry Content
Objective	5.9 Write a two column proof
Critical Thinking	**Reasoning and Argumentation:** Construct well-reasoned arguments or proofs to explain issues; Address challenges by providing a logical explanation or refutation, or by acknowledging the accuracy of the challenge

~~Think of writing a proof like solving a crime. You survey the crime scene, gather the facts, and write them down in your memo pad. To solve the crime, you take the known facts and, step by step, show who committed the crime. You conscientiously provide supporting evidence for each statement you make. We are not trying to "find an answer", but rather a process for which allows us to prove that something is in fact, true.~~

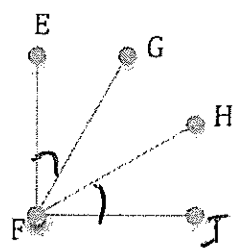
SUBSTITUTION

EXAMPLE 1:
Given: XY = AB
Prove: AB + YZ = XZ



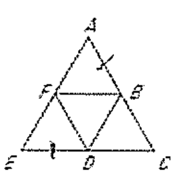
S	R
① XY = AB	① given
② XZ = XY + YZ	② segment + postulate
③ XZ = AB + YZ	③ substitution

EXAMPLE 2:
Given: $\angle EFG \cong \angle HFJ$
Prove: $\angle EFH \cong \angle GFH + \angle HFJ$



S	R
① $\angle EFG \cong \angle HFJ$	① given
② $\angle EFH = \angle EFG + \angle GFH$	② angle addition postulate
③ $\angle EFH = \angle HFJ + \angle GFH$	③ substitution

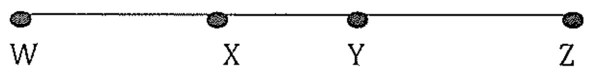
1.
Given: ED = AB
Prove: EC = AB + DC



S	R
① ED = AB	① given
② EC = ED + DC	② segment addition post.
③ EC = AB + DC	③ substitution

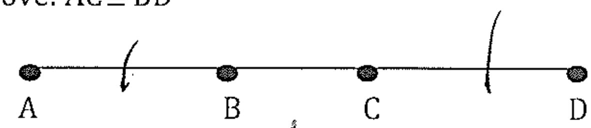
ADDITION

EXAMPLE 3:
Given: $WX \cong YZ$
Prove: $WY \cong XZ$



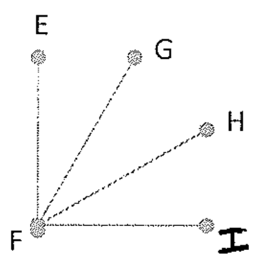
S	R
1) $WX \cong YZ$	1.) Given
2) $XY \cong XY$	2.) Reflexive
3) $\boxed{WX + XY} \cong YZ + XY$	3.) add. prop. of =
4.) $WY = \boxed{WX + XY}$ $XZ = XY + YZ$	4.) segment add. post.
5.) $WY \cong XZ$	5.) substitution

2.
Given: $AB \cong CD$
Prove: $AC \cong BD$



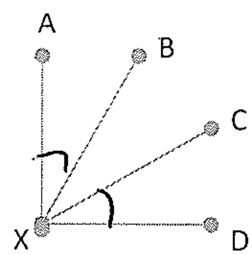
S	R
1 $AB \cong CD$	1 Given
2 $BC \cong BC$	2 Reflexive
3 $AB + BC \cong CD + BC$	3 add prop
4 $AC = AB + BC$ $BD = BC + CD$	4 segment add. prop.
5 $AC = BD$	5 substitution

EXAMPLE 4:
Given: $\angle EFG \cong \angle HFJ$
Prove: $\angle EFH \cong \angle GFI$



S	R
1.) $\angle EFG \cong \angle HFI$	1.) Given
2.) $\angle GFH \cong \angle GFH$	2.) Reflexive
3.) $\boxed{\angle EFG + \angle GFH} = \angle HFI + \angle GFH$	3.) add prop. of =
4.) $\angle EFH = \boxed{\angle EFG + \angle GFH}$ $\angle GFI = \angle GFH + \angle HFI$	4.) angle addition postulate
5.) $\angle EFH \cong \angle GFI$	5. substitution

3.
Given: $\angle AXB \cong \angle CXD$
Prove: $\angle AXC \cong \angle BXD$



S	R
1.) $\angle AXB \cong \angle CXD$	1.) Given
2.) $\angle BXC \cong \angle BXC$	2.) Reflexive
3.) $\boxed{\angle AXB + \angle BXC} = \angle CXD + \angle BXC$	3.) add prop
4.) $\angle AXC = \boxed{\angle AXB + \angle BXC}$ $\angle BXD = \angle BXC + \angle CXD$	4.) angle add.
5.) $\angle AXC \cong \angle BXD$	5.) Substitution

PUSH IT TO THE LIMIT.

SUBTRACTION

EXAMPLE 5:

Given: AC = BD

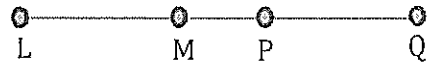
Prove: AB = CD

S	R
① $AC = BD$	① given
② $BC = BC$	② reflexive
③ $AC = AB + BC$	③ segment
④ $BD = BC + CD$	④ addition postulate
⑤ $AB + BC = BC + CD$ $-BC \quad -BC$	⑤ substitution
⑥ $AB = CD$	⑥ subtraction property of =

4.

Given: LP = MQ

Prove: LM = PQ



S	R
① $LP = MQ$	① given
② $MP = MP$	② reflexive
③ $LP = LM + MP$	③ segment addition
④ $MQ = MP + PQ$	④ postulate
⑤ $LM + MP = MP + PQ$ $-MP \quad -MP$	⑤ substitution
⑥ $LM = PQ$	⑥ subtraction prop of =

TRANSITIVE (& SYMMETRIC)

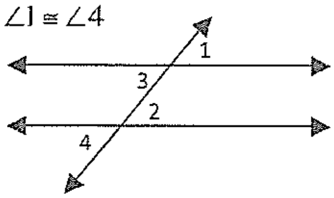
EXAMPLE 6:

Given: $\angle 1 \cong \angle 3$

$\angle 3 \cong \angle 2$

$\angle 2 \cong \angle 4$

Prove: $\angle 1 \cong \angle 4$



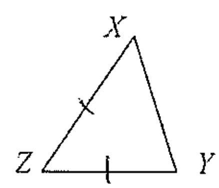
S	R
① $\angle 1 \cong \angle 3$, $\angle 3 \cong \angle 2$	① given
② $\angle 1 \cong \angle 2$	② transitive
③ $\angle 2 \cong \angle 4$	③ given
④ $\angle 1 \cong \angle 4$	④ transitive

5.

Given: $XZ \cong ZY$

$ZY \cong YX$

Prove: $XZ \cong YX$



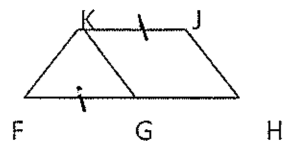
S	R
① $XZ \cong ZY$, $ZY \cong YX$	① given
② $XZ \cong YX$	② transitive

EXAMPLE 7: *TRANSITIVE WILL NOT ALWAYS BE IN ORDER!

Given: FG ≅ KJ

GH ≅ KJ

Prove: FG ≅ GH



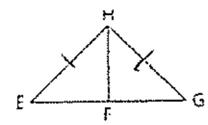
S	R
① FG ≅ KJ GH ≅ KJ	① given
② KJ ≅ GH	② symmetric
③ FG ≅ GH	③ transitive

6.

Given: HE ≅ HG

FG ≅ HG

Prove: HE ≅ FG



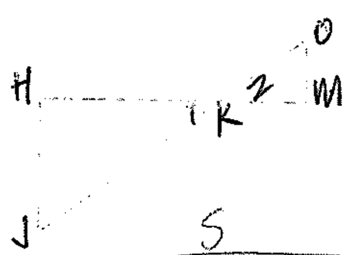
S	R
① HE ≅ HG FG ≅ HG	① given
② HG ≅ FG	② symmetric
③ HE ≅ FG	③ transitive

VERTICAL ANGLES

EXAMPLE 8:

Given: $\angle J \cong \angle 1$

Prove: $\angle J \cong \angle 2$



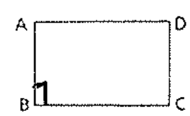
S	R
① ∠J ≅ ∠1	① given
② ∠1 ≅ ∠2	② vertical angles
③ ∠J ≅ ∠2	③ transitive

PERPENDICULARITY

EXAMPLE 9:

Given: $\overline{AB} \perp \overline{BC}$, $\overline{DC} \perp \overline{BC}$

Prove: $\angle B \cong \angle C$



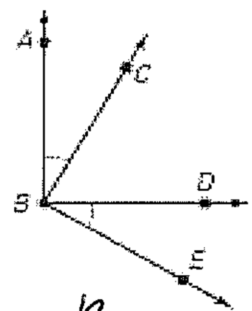
S	R
① AB ⊥ BC	① Given
② ∠B is a right angle	② def'n of ⊥ lines
③ DC ⊥ BC	③ given
④ ∠D is a right ∠	④ def'n ⊥ lines
⑤ ∠B ≅ ∠D	⑤ def'n ≅ angles

Name: answer key TP: ______

HW#39H: Two Column Proofs
Honors Geometry
Due Date: Wednesday, Nov. 14th, 2012

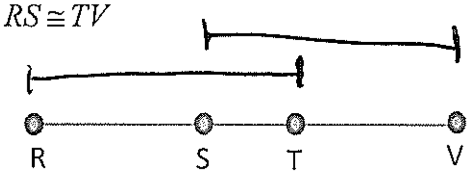
Failure to show work on all problems or use complete sentences will result in a LaSalle.

1) Use the Addition Property
Given: $\angle ABC \cong \angle DBE$
Prove: $\angle ABD \cong \angle CBE$



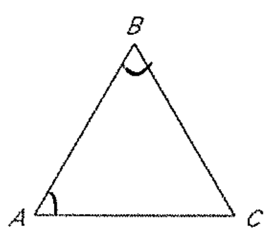
S	R
1.) $\angle ABC \cong \angle DBE$	1.) Given
2.) $\angle CBD \cong \angle CBD$	2.) Reflexive
3.) $\angle ABC + \angle CBD = \angle DBE + \angle CBD$	3.) add prop of =
4.) $\angle ABD = \angle ABC + \angle CBD$, $\angle CBE = \angle CBD + \angle DBE$	4.) angle addition prop
5.) $\angle ABD \cong \angle CBE$	5.) substitution

2) Use the Subtraction Property
Given: $RT \cong SV$
Prove: $RS \cong TV$



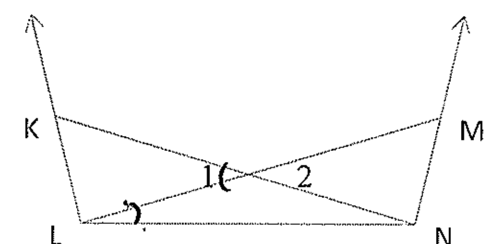
S	R
1.) $RT \cong SV$	1.) Given
2.) $ST \cong ST$	2.) Reflexive
3.) $RT = RS + ST$, $SV = ST + TV$	3.) seg + post.
4.) $RS + ST = ST + TV$, $-ST \quad -ST$	4.) substitution
5.) $RS = TV$	5.) subtraction

3) Use the Transitive Property
GIVEN: $m\angle A = m\angle B$
$m\angle C = m\angle B$
PROVE: $\angle A \cong \angle C$



S	R
1.) $m\angle A = m\angle B$	1.) Given
2.) $m\angle C = m\angle B$	2.) Given
3.) $m\angle B = m\angle C$	3.) symmetric
4.) $m\angle A = m\angle C$	4.) transitive

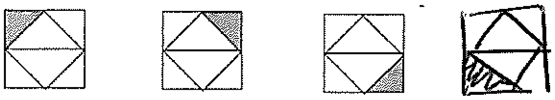
4) Use Vertical Angles
Given: $\angle MLN \cong \angle 1$
Prove: $\angle MLN \cong \angle 2$



S	R
1.) $\angle MLN \cong \angle 1$	1.) Given
2.) $\angle 1 \cong \angle 2$	2.) vertical angles
3.) $m\angle MLN = \angle 2$	3.) transitive

PUSH IT TO THE LIMIT.

QUIZ REVIEW!

5) Is the following an example of inductive or deductive reasoning? Determine the next figure.	6) Is the following an example of inductive or deductive reasoning? Explain.
 inductive	***All athletes work out in the gym. Barry Bonds is an athlete. Therefore, Barry Bonds works out in the gym.*** deductive

Two adjacent angles are a linear pair.

		True/False
7) Conditional Statement	If two angles are adjacent, then they are a linear pair	F
Converse	if two angles are linear pair, then they are adjacent	T
Inverse	if two angles are not adj, they are not linear pair	T
Contrapositive	If two angles are not a linear pair, then they are not adjacent	F

8)

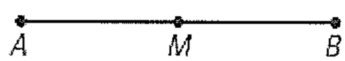
$\angle 1$ and $\angle 2$ are vertical angles, and $\angle 2 \cong \angle 3$.

Show that $\angle 1 \cong \angle 3$.

$\angle 1 \cong \angle 2$	vertical angle Theorem
$\angle 2 \cong \angle 3$	Given
$\angle 1 \cong \angle 3$	transitive Property of Congruence

9) In the diagram, M is the midpoint of $\overline{AB}$.

Show that $AB = 2 \cdot AM$.



$MB = AM$	Definition of midpt
$AB = AM + MB$	seg add Postulate
$AB = AM + AM$	substitution Property of Equality
$AB = 2 \cdot AM$	Distributive property

10)

Name the property that the statement illustrates.

1. If $DF = FG$ and $FG = GH$, then $DF = GH$. transitive
2. $\angle P \cong \angle P$ reflexive
3. If $m\angle S = m\angle T$, then $m\angle T = m\angle S$. symmetric

11) Solve $5(x - 4) = 3x + 2$. Write a reason for each step.

S	R
$5(x-4)=3x+2$	given
$5x-20=3x+2$	dist
$2x-20=2$	subt
$2x=22$	add
$x=11$	division

PUSH IT TO THE LIMIT.